Coastal landscapes resilience: A method for analysis and evaluation

Giampiero Lombardini[*]

Abstract

The coastal landscapes can be interpreted as geographical spaces with high sensitivity. The pressure of urbanization in these high fragility territories determines serious environmental crises. The high density of the values in these areas (quality landscapes, ecosystem services, concentrated presence of resources) is constantly threatened not only by climate change but above all by the same processes of urbanization. According with a systemic approach, resilience is the ability of an ecosystem (or more precisely a social system and ecosystem at the same time) to adapt itself by change its internal relations and maintaining the identity values of a landscape.

In the method of analysis here proposed, starting from the recognition of heritage elements, the system of values is compared with the conditions of risk and degradation (due to environmental and man-made drivers) with the result of building maps of vulnerability and resilience.

---

[*]DSA, University of Genoa, Italy.

Introduction: cultural landscape definition

Cultural landscapes, and specifically the coastal landscapes, can be interpreted as complex systems, namely systems that through their capacity of self-organization, rise their identity and maintain it over the time. According to European Landscape Convention, "landscape" is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human fact. More precisely, landscape is a homogeneous part of the territory whose features are derived from nature, human history and their mutual interrelationships. The protection and enhancement of the landscape safeguard its values, expressed such events of perceptible identity.

So, landscape is not due to a mere aesthetic interpretation:

- its quality depends both on the objective regional features that from the aspirations of the population that is in contact with it;
- the implementation of landscape policies should be based on the value that populations attribute to "their" landscape: object of the landscape policy must be both the landscapes of high quality (to protect) that the degraded (to improve);
- landscape is the result of the interaction between the natural environment and human intervention and has often historical nature and value; It will then present in certain contexts the meaning of cultural heritage and as such it will be subject to appropriate conservation actions.

The coastal landscapes characterized by a strong human dimension and high capitalization, can be intended, by this way, as a specific form of cultural landscape conceived as a wide field of relationships that concern not only the perceptual aesthetic dimensions, but also include ecological

processes, the economic and social dynamics, the complex set of human artifacts and their relationships.

Figure 1 – Cultural landscape definition as a socio ecological system, namely a "complex system"
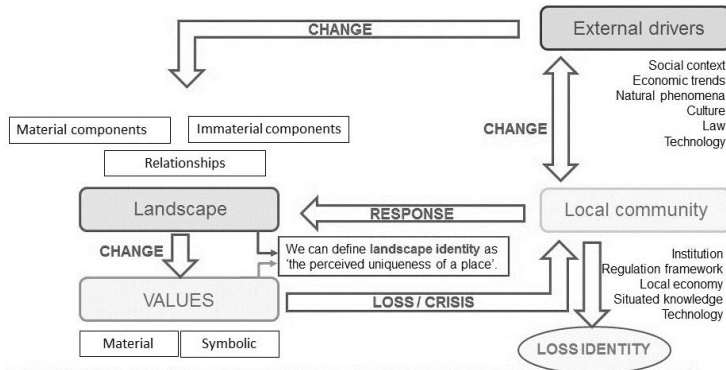
Resilience conceptualization

In the definition of resilience, it has assisted in time to a shift of the equilibrium concept to that of adaptation. So, resilience can be defined, in turn, as:

- the capacity of a perturbed system of return to the equilibrium state after a period of initial crisis;
- the ability of a system to adapt to and persist to external disturbances without necessarily return to the state of initial equilibrium;
- the ability of a complex socio-economic system to evolve and to adapt and innovate in response to external stress disorders;
- the ability to develop adaptive capacity through self-organization that preserves the identity of the system through change.

Ultimately, the latest of resilience definitions define it as a transformation a transformation process that affects the

entire system and that tends to preserve its identity through adaptive behaviour. If we consider the cultural landscape as a complex system, then we can interpret the resilience as the intelligence of a community facing their own difficulties (external events) continuously regenerating its own memory and its own symbolic system.

The question of identity

A complementary perspective on resilience focuses on system identity: resilience equates to the maintenance of key components and relationships and the continuity of these through time. If resilience is low, identity may be lost. Resilience can thus be operationalized by quantifying identity and assessing the potential for changes in identity. The identity of a complex system at time t_0 can be defined as a relatively stable set of tangible and intangible components and relationships recognized by the community and recognizable from the outside. In policies and actions that are implemented for the landscape transformation (or even in actions for its preservation), that then has to be evaluated is the degree of persistence of the variables which define the identity of each specific and recognizable landscape.

Table 1 – Resiliency features of a cultural landscape

FRAGILE	RESILIENT(ANTI-FRAGILE)
Isolated - detached	Connected
Uniform - serial	Differentiated
Poor	Rich
Scarce	Redundant
Unable	Capable

The components that define the vulnerability or, conversely, the resilience of a landscape refer to general characteristics that we can recognize as vital characteristics in complex

systems. The main components are: connectivity, diversity, richness, productivity. From these properties it can detect the features that define the level of fragility / resilience of a landscape.

External drivers of resilience and the measure of resilience

The hypothesis put forward by the research is that, among others, the two main phenomena triggered by external drivers of change (and possibly amplified by local fragility) are attributable to two main phenomena:

- urbanization (interpreted as double polarity of the dynamic densification / abandonment and then concentration / depletion);
- real estate development (again, to be understood in the double dimension of the over- or under economic assessment of land values).

In particular, the process of urbanization may comprise three basic components:

- Intensive use of land that results in a general over-use of territorial assets;
- Abandonment in many rural areas and within certain urban areas;
- Misuse, which manifests itself in distortions in the spatial distribution of land uses (compression of the public space, development of secondary residences, landscape fragmentation, loss of ecosystem services.

Conclusions

The resilience factors for the coastal cultural landscape of the research (the eastern Liguria region) have generated

spatial indicators and vulnerability maps, according to the
following pairs of elements:

- Density / distribution: for some items, such as the
  provision of services, the spatial density is critical; while
  in other cases what we must try to ensure, maintain or
  restore is the diffusive size;
- Connection / decoupling: in particular situations the
  system connectivity is a primary element for maintaining
  the system (i.e.: these refer to the ecological networks),
  but in some cases the system can be defined more
  resilient where it possesses a diversification capacity;
- Diversity / homogeneity;
- Productivity: namely the landscape's ability to maintain
  over time its propensity to produce and process material
  goods and values (tangible and intangible).

References

Pieninger T., Bieling C (eds.) (2012), *Reslilience and the Cultural Landscapes*, Cambridge, University Press.

Rohring A., Gailing L. (2011), Path dependency and resilience: The example of landscape region. In Muller B., (2011) *Urban Regional Resilience: How Do Cities and Regions Deal with Change?,* German Annual of Spatial Research and Policy, Heidelberg, Springer.

Taleb N.N (2012), *Antifragile: Things That Gain From Disorder*, London, Penguin.

Cassatella C., Peano A. (2011), *Landscape Indicators. Assessing and Monitoring Landscape Quality*, Dordrecht, Springer.